

ACPI And Device Trees – Friends Or Foes?

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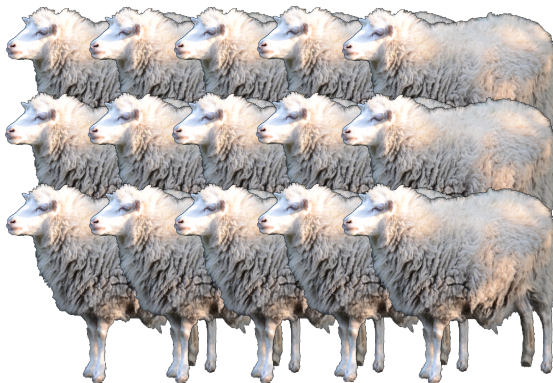
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October 15, 2014

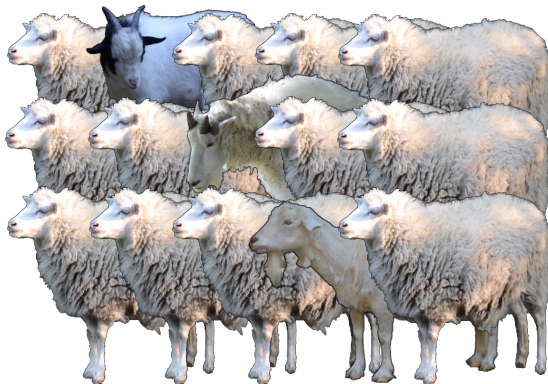
Outline

- 1 Introduction
 - Origins of ACPI
 - Motivation for Device Trees
- 2 ACPI vs Device Trees
 - Differences and Analogies
 - Putting It All Together
- 3 Matching Devices to Drivers
 - Existing Driver Lookup Algorithms
 - Driver Lookup Unification
- 4 Resources

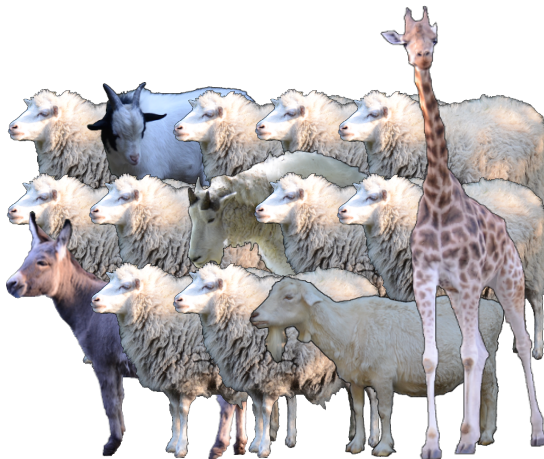
PC Monoculture (Hardware Compatibility Everywhere)



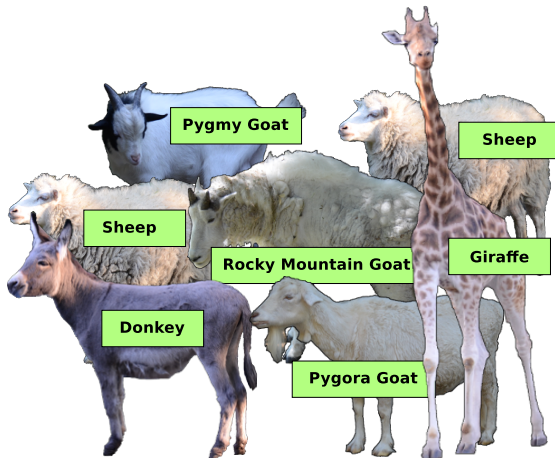
Differences Appear (Slightly Incompatible Hardware)



Substantial Differences (Not Really Compatible Any More)



Solution: Platform Description Protocol



ACPI: Advanced Configuration and Power Interface

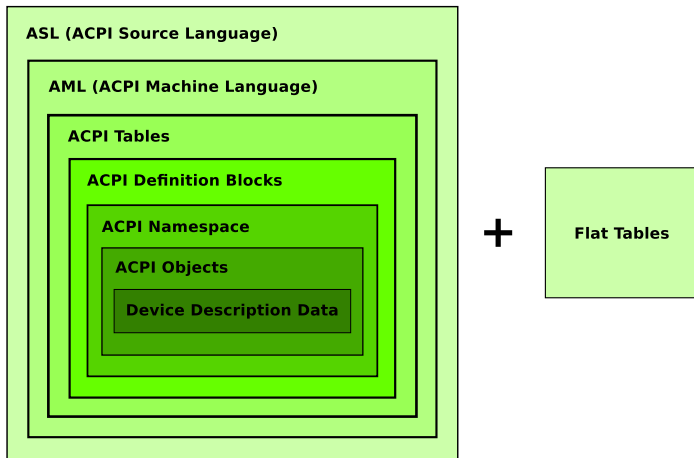
Idea (on top of the platform description)

High-level interface for driving platform hardware.

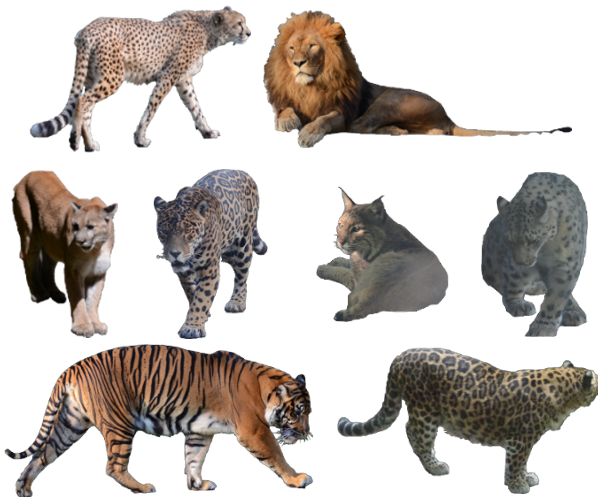


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ACPI Complexity

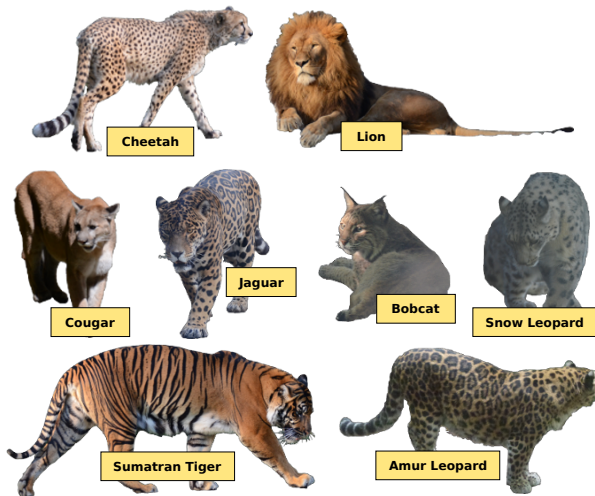


ARM: Same Architecture, Different Platforms



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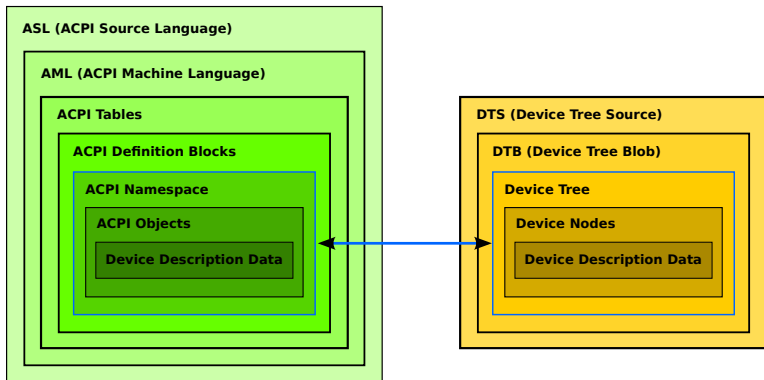
Solution: Platform Description Protocol



Flattened Device Tree

```
/ {  
    node1 {  
        a-string-property = "A string";  
        a-string-list-property = "first string", "second string";  
        a-cell-property = <1 2 3 4>; /* each number (cell) is a uint32 */  
        child-node1 {  
            first-child-property;  
            second-child-property = <1>;  
            a-string-property = "Hello, world";  
        };  
        child-node2 {  
        };  
    };  
    node2 {  
        an-empty-property;  
        a-byte-data-property = [0x01 0x23 0x34 0x56];  
        child-node1 {  
        };  
    };  
};
```

ACPI and DT Side-by-Side



The Missing Link

_DSD (Device Specific Data) introduced in ACPI 5.1

```
Name (_DSD, Package () {  
    ToUUID("<UUID string>"), // Format identifier  
    Package () {  
        ... // Device data in the given format  
    }  
})
```

Device Properties UUID: daffd814-6eba-4d8c-8a91-bc9bbf4aa301

```
Name (_DSD, Package () {  
    ToUUID("daffd814-6eba-4d8c-8a91-bc9bbf4aa301"),  
    Package () {  
        Package {"a-string-property", "A string"},  
        Package {"a-string-list-property", Package {"first string", "second string"}};  
        Package {"a-cell-property", Package {1, 2, 3, 4}};  
    }  
})
```

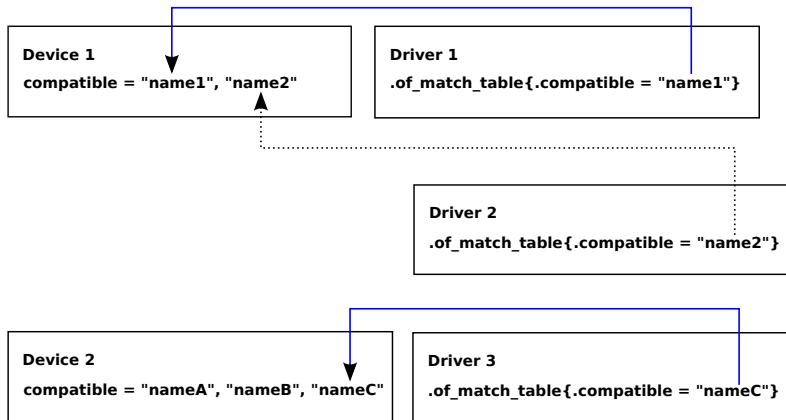
Unified Device Properties API

```
- if (of_property_read_u32(np, "size", &val) == 0 ||
- of_property_read_u32(np, "at25,byte-len", &val) == 0) {
+ if (device_property_read_u32(dev, "size", &val) == 0 ||
+ device_property_read_u32(dev, "at25,byte-len", &val) == 0) {
    chip->byte_len = val;
} else {
    dev_err(dev, "Error: missing \"size\" property\n");
    return -ENODEV;
}

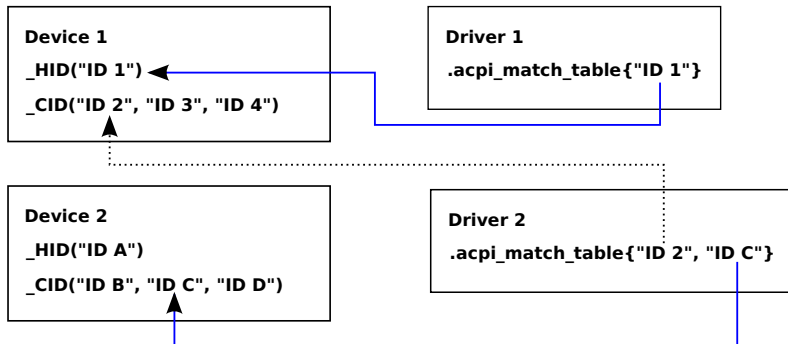
- if (of_property_read_u32(np, "pagesize", &val) == 0 ||
- of_property_read_u32(np, "at25,page-size", &val) == 0) {
+ if (device_property_read_u32(dev, "pagesize", &val) == 0 ||
+ device_property_read_u32(dev, "at25,page-size", &val) == 0) {
    chip->page_size = (u16)val;
} else {
    dev_err(dev, "Error: missing \"pagesize\" property\n");
    return -ENODEV;
}

- if (of_property_read_u32(np, "at25,addr-mode", &val) == 0) {
+ if (device_property_read_u32(dev, "at25,addr-mode", &val) == 0) {
    chip->flags = (u16)val;
} else {
```

Driver Lookup the DT Way



Driver Lookup the ACPI Way



ACPI/PNP Device IDs Problem

leds-gpio driver

```
static const struct of_device_id of_gpio_leds_match[] = {  
    { .compatible = "gpio-leds", },  
    { },  
};
```

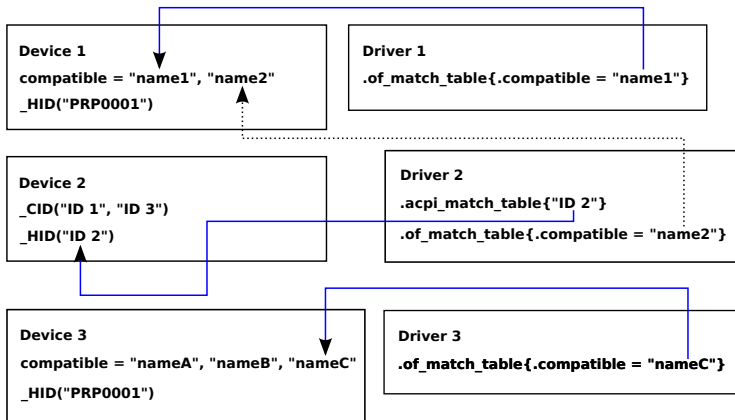
gpio_keys_polled driver

```
static const struct of_device_id gpio_keys_polled_of_match[] = {  
    { .compatible = "gpio-keys-polled", },  
    { },  
};
```

Question

What ACPI/PNP IDs to use with these drivers?

Drivers Using the Uniform Device Properties API



References



UEFI, *Advanced Configuration and Power Interface Specification, Revision 5.1*
(http://www.uefi.org/sites/default/files/resources/ACPI_5_1release.pdf).



UEFI, *Device Properties UUID For _DSD, Revision 1.0*
(http://www.uefi.org/sites/default/files/resources/_DSD-device-properties-UUID.pdf).



Device Tree Wiki, *Device Tree Usage* (http://www.devicetree.org/Device_Tree_Usage).



Thomas Petazzoni, *Device Tree for Dummies*
(<http://events.linuxfoundation.org/sites/events/files/slides/petazzoni-device-tree-dummies.pdf>).

Documentation And Source Code

- <http://http://git.kernel.org/cgit/linux/kernel/git/rafael/linux-pm.git/log/?h=device-properties>
- Documentation/devicetree/
- Documentation/acpi/
- drivers/acpi/
- drivers/of/

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Thanks!

Thank you for attention!